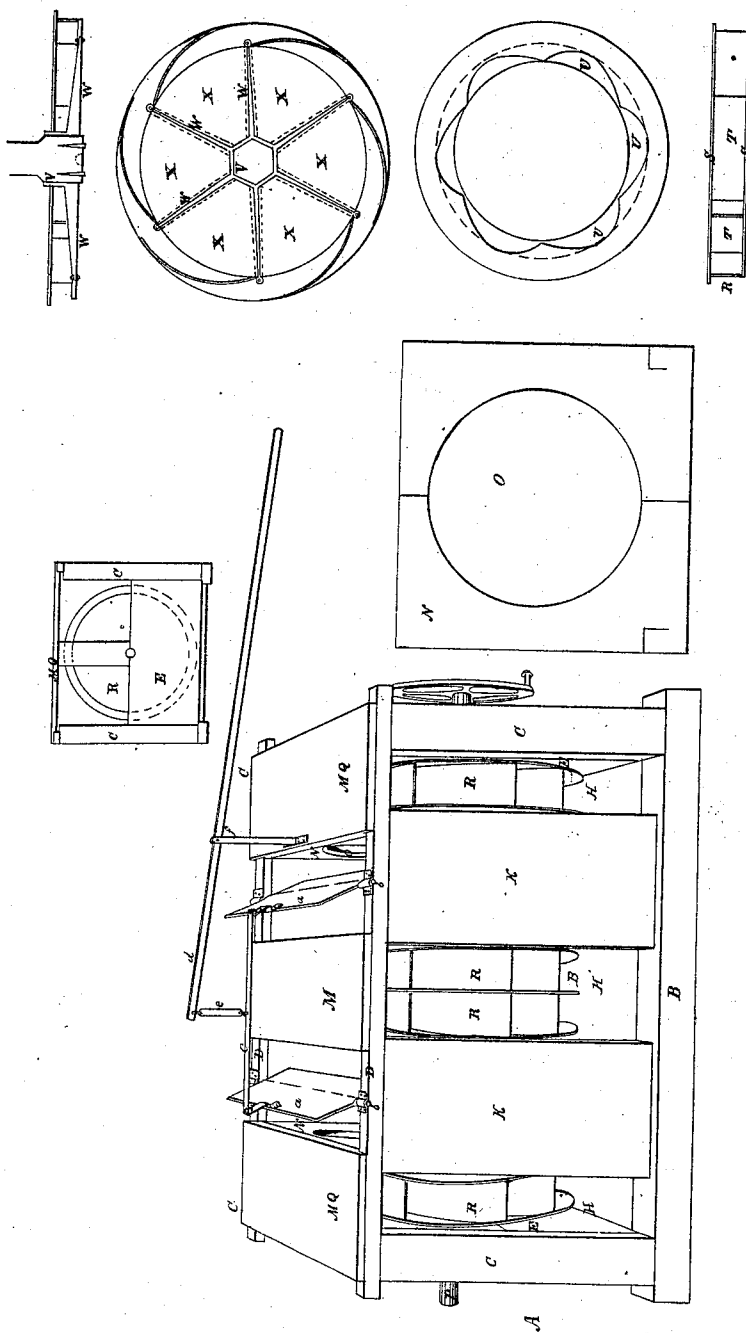


G. HOTCHKISS.
 REACTING WATER WHEEL.

No. 110.

Patented Jan. 9, 1837.



UNITED STATES PATENT OFFICE.

GIDEON HOTCHKISS, OF WINDSOR, NEW YORK.

CONSTRUCTION OF REACTING WATER-WHEELS AND THEIR APPENDAGES.

Specification of Letters Patent No. 110, dated January 9, 1837; Antedated November 30, 1836.

To all whom it may concern:

Be it known that I, GIDEON HOTCHKISS, of Windsor, in the county of Broome and State of New York, have invented a new and useful Improvement in the Construction and Mode of Application of Reaction Water-Wheels and Their Appendages for Propelling Machinery, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Section 1.—The wheel case A, (say for a saw or grist mill having six feet head of water) is composed of two sills B B 7 by 9 inches thick, hard wood; or 8 by 10 inches if made of pine,—and of any convenient length;—four posts C C C C four feet four inches long and 8 inches square;—two plates D D same length as sills 3 by 6 inches;—two end girts E E serving as head blocks, for the wheel shaft to turn in, 5 feet long, 2 feet wide by 8 inches thick. The whole framed well together. Intermediate posts and girts are framed between the corner posts so as to divide the case into several spaces H to admit the reacting wheels R R &c. Two planks K K two feet wide and 3 inches thick are framed vertically with crotch tenons into the sills and plates having a space H', of about 15 inches between them. In a line with each of these planks frame a bottom plank from sill to sill 2 feet wide and 3 inches thick, tenoned into the sills, the upper side one inch below the top of the sill. Over the spaces between the planks just mentioned and projecting two inches over each contiguous vertical plank place transverse planks termed copes M halved or rabbeted so as to let the bottom of each lie half an inch below the tops of the plates. Groove it on the under side, near each edge to receive the partitions or decks N, which are also let into grooves in the bottom planks. The decks are each made of two planks 2 feet wide by 2 inches thick, tenoned into the bottom and top planks and cut out in the center. In a circle Q, equal to the inner diameter of the shroud or rim of the water wheel. Two wheels united together are placed between each pair of partitions or decks under the transverse copes—there being two openings three spaces and four wheels, each wheel having six pieces $2\frac{1}{2}$ by 6 inches each, and the wheel being 23 inches diameter to the center of the issues and $7\frac{1}{4}$ inches deep. The intermediate part of the

main frame containing these wheels is 7 feet 11 inches long by 5 feet wide from out to out of post. These pieces are wedged on to a shaft P lying longitudinally near the center of the frame and supported by the end as cross girts on which it turns. Near each end of the frame is a single cope M Q extending to the outside of the posts to cover the single wheel, having partitions or decks constructed in the manner before described for the double wheels, except that the outer or end wheel is visible.

Section 2.—The wheels R are made of cast iron, but may be made of any suitable material. Each wheel is composed of two rims or shrouds S placed parallel, between which are arranged the curved buckets T (being six or more in number) in such a manner as to form issues for the water end that shall leave the wheel nearly at a tangent, or right angles to the diameter. One side or face of the wheel is opened—the other is closed. The rim toward the open side between the ends of the buckets nearest the center of the wheel is scalloped or cut away in the manner represented at U somewhat in the form of a reaper's sickle so as to enlarge the vortex or opening of the wheel. These scallops should be cut so as to leave the outer or face side sharp over and near the issue to cut away opposing substances, such as leaves, straw, wood, &c., that might pass into the wheel. This face, shroud or rim must be made wider than the rear shroud to strengthen it where the scallops are cut.

Section 3.—The wheels may be cast of an entire piece, or in several pieces bolted together. They may also be cast with all the shrouds or rims open, with bolt holes in them so that the wheels may be reversed at pleasure on a wooden head or hexagonal hub or core fastened on the axle, in order to change the direction of the wheel at pleasure.

Section 4.—The wheels are placed vertically on horizontal shafts in pairs, or single, with their closed sides or heads in contact when arranged in a pair or pairs; the single wheel, however, at the end of the case having its closed head toward the end of the axle and its open side facing the open side of one of the first pair next to it, leaving sufficient space between them for the water to pass in around the axle to supply the two wheels to advantage.

Section 5.—Several axles may be coupled

together by extending the wrists of the cranks formed on them beyond the face of the pitman rods so as to lap over each other.

Section 6.—When the wheel is designed to
 5 turn horizontally and to be reversed, make of cast iron a hexagonal hub V with six or more arms W radiating from its angles having at their extremities bolt holes for securing either shroud of the wheel to the same
 10 at pleasure, and in which shrouds are corresponding bolt holes. Said arms being made deeper at their junction with the hub and tapering gradually to a suitable size at their extremities—the lower edges being made
 15 horizontal with flanges for the wooden flooring or bottom of the wheel (made in six or more pieces) to rest on—the horizontal figure of each piece corresponding with the figure between each pair of arms—the vertical
 20 section corresponding with the shape of the side of the arm. The end of the shaft to which the wheel is wedged is made hexagonal to correspond with the hexagonal mortise of the wheel. A wheel thus made
 25 is not liable to crack from the unequal shrinking of the metal in cooling—the arms and shrouds being cast separate. Besides it is much stronger and more effective than one with an entire wooden bottom and is not so
 30 heavy and costly as one entirely of iron. Another advantage arises from having a less quantity of iron in a wheel of equal power with one containing a greater quantity and in having a less weight resting on the pivot,
 35 which, in the reacting wheel never wears centrally.

Section 7.—The diameter of the wheels, the quantity of water admitted, the size of timber used—the number of wheels on an
 40 axle and the dimensions of wheel cases should be varied to suit the particular circumstances of each mill and site or water power.

Section 8.—The gates *a* which I generally use are made of wood or iron corresponding 45 in size and number to the openings in the wheel case, turning on pivots, resting on the caps of the case and connected together by rods, attached to the end of a lever *d* by a connecting bar *e*—said lever moving on a 50 fulcrum on the top of the case, by which the gates are opened or closed simultaneously.

Section 9.—The gates may also be composed of plank $2\frac{1}{2}$ or 3 inches thick, $4\frac{1}{2}$ feet long, and a little wider than their corre- 55 sponding openings over which they are placed—are coupled by plates or otherwise and supported by friction wheels on the plates of the case—or suspended by hangings above. To let the water on to the 60 wheels, they are all made to move endwise of the frame.

Section 10.—The invention claimed by the subscriber and desired to be secured by Letters Patent consists in— 65

1. Scalloping the face, shroud or rim of the wheel in the manner described in section 2.

2. The manner of constructing the wheel to be turned on the head so as to reverse its 70 motion as described in section 3.

3. The manner of constructing the wheel with cast iron hub and arms as described in section 6, and the use and application of the combined pivot gates or valves for letting 75 on and shutting off the water in this manner described in section 8; also in making the wheel case portable or entirely independent of the mill frame with the axles of the wheels supported by and turning in the 80 same in manner described in section 1.

GIDEON HOTCHKISS.

Witnesses:

WM. P. ELLIOT,
 WM. BISHOP.